State of California THE RESOURCES AGENCY Department of Fish and Game

YUMA CLAPPER RAIL STUDY
- CENSUSES AND HABITAT DISTRIBUTION
1973-74

by

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Wildlife Management Branch

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ABSTRACT

Censuses of the Yuma clapper rail were conducted along the Colorado River and in the Imperial Valley by individuals of a multi-agency team. Nine hundred and five and 919 Yuma clapper rails were located during the May counts in 1973 and 1974 respectively.

Twenty-four areas of importance to Yuma clapper rails were identified by checking census results and evaluation of available rail habitat. Approximately 80 percent of all clapper rails found were located in these areas. Five areas of utmost importance maintained 42 to 52 percent of all clapper rails found. One of these five areas is in Imperial Valley, and two of the four areas along the Colorado River are located in the Colorado River delta in Mexico. Of the two remaining areas, one is in a national wildlife refuge and the other, the single most important area, is controlled by the Bureau of Land Management. Thirty-three to 36 percent of all clapper rails were found on areas of importance in state or federal refuges.

Recommendations were made for the continuation of yearly counts of the Yuma clapper rail and for protection of areas of important habitat.

^{1/} Wildlife Management Branch Administrative Report No. 75-2 (April, 1975).
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 Nongame Wildlife Investigations.

RECOMMENDATIONS

As a result of these studies, and based on information available at this time, the following recommendations are made to better understand the distribution of the Yuma clapper rail and to ensure maintenance of its habitat.

- 1. Determine land ownership of rail habitat extending south from Imperial Dam and including Mexico.
- 2. Initiate a study of the status of the Yuma clapper rail in Mexico.
- 3. Develop Yuma clapper rail habitat management plans by all federal and state agencies administering lands occupied by this rail.
- 4. Conduct a rail census of all habitat areas, including the Colorado River delta in Mexico and the Imperial Valley, every three years.
- 5. Perform yearly censuses of important habitat areas to monitor yearly population variations.

INTRODUCTION

In 1966 the U. S. Department of the Interior declared the Yuma clapper rail (Rallus longirostris yumanensis) to be endangered. In California, Arizona, Baja California and Mexico, this subspecies inhabits fresh water marshes along the lower Colorado River from the Nevada-California border south to the delta. It also occurs along the Gila River, Arizona, Salton Sea, California and in Sonora, Mexico. Much concern has been expressed over the status of this rail because of the lack of knowledge concerning its distribution and abundance. Alarm was expressed that dredging, filling and channelization operations along the lower Colorado River had destroyed much of its habitat and because of this and other reasons the Yuma clapper rail was thought to be faced with extinction.

On September 14, 1972 an interagency meeting called by the Bureau of Reclamation was held in Parker, Arizona to discuss measures needed to ensure the survival of the Yuma clapper rail. Personnel from the California Department of Fish and Game, Arizona Game and Fish Department, U. S. Fish and Wildlife Service, Bureau of Land Management, Bureau of Reclamation, and Arizona State University formed a recovery team. This committee programmed a study on Topock Marsh of the habitat preferences, densities, territory size, and migration patterns of the Yuma clapper rail and a literature review of all known written material pertaining to the Yuma clapper rail. Phil Smith, of Arizona State University, accomplished this study in 1973 and 1974 (Smith 1974a). Additionally it was decided to perform a complete clapper rail census along the Colorado River in 1973. This census was repeated in 1974 and the Imperial Valley area of California was included in the census area (Smith 1974b). A study was then conducted to establish the present distribution of marsh habitat available and important to Yuma clapper rails.

CENSUSES

Methods

In both 1973 and 1974 Yuma clapper rail censuses were conducted during the last two weeks in May by members of the recovery team and other agency and volunteer personnel. Appended (Appendices 1 and 2) are a listing of current members of the Yuma Clapper Rail Recovery Team and, the agencies assigned to conduct censuses.

Censusing was accomplished by penetrating marsh areas by boat and on foot and playing recorded clapper rail calls during early morning and late afternoon hours. The number of individual rails respondingwas noted and represented the minimum number of rails in the census areas.

Results

Results of the 1973 and 1974 censuses have been summarized in Appendix 3, and the distribution of the rails is shown in Appendix 4 and Figures 1 through 7 (appended).

Colorado River

Results show that Yuma clapper rails are distributed along the Colorado River from the delta to just north of Needles. The major population concentration has been in the Imperial Division where slightly less than 40 percent of the

rails located along the Colorado River were found. In this division the majority were located in the lower portion, from Martinez Lake to Imperial Dam. Other areas of high population concentrations along the Colorado River included Topock Marsh, just upstream from Blankenship Bend, and the delta.

Imperial Valley

No census was made of the Imperial Valley area in 1973. In 1974, 14.5 percent of all Yuma clapper rails that were found were located in Imperial Valley. Sixty-five percent of these rails were located in the Wister Unit of the Imperial Wildlife Area. Other rails were found on The Finney-Ramer Unit of Imperial Wildlife Area, on Salton Sea National Wildlife Refuge, and in the deltas of the New and Alamo Rivers. Other areas censused, but where no clapper rails were found were the river sections of the New and Alamo Rivers, north coast of Salton Sea, San Felipe Creek, Whitewater River, Mineral Springs Wash, Salt Creek, and seep areas west of the All American Canal. Also seep areas along the Coachills Canal provide habitat where clapper rails were found in October 1974 (Stacey, pers. corn.). These areas should be checked in future clapper rail censuses to determine if the rails use these areas during the breeding season.

Further discussion of the distribution of Yuma clapper rails is included in the following section on the distribution-of marsh habitat important to the rails.

HABITAT EVALUATION

Objectives

Four major objectives of this study were to:

- 1. Develop habitat requirement criterion.
- 2. Assess all marsh habitat along the Colorado River in California has not been reserved in the federal refuge system.
- 3. Determine distribution of habitat important to Yuma clapper rails.
- 4. Present recommendations for the preservation of important habitat areas not already secured in state and federal refuge systems.

Timing and Study Area

All marshes along the Colorado River, in mid-channel and along the west bank in California, outside of national wildlife refuge boundaries, were checked from June through mid-September 1974. During this time additional small sections of marsh along the west bank in Nevada and east bank in Arizona were checked.

Phil Smith, who was initially employed on this study, inventoried habitat in the Palo Verde, Cibola and Imperial divisions in June. I was responsible for, the habitat inventory of the Imperial, Laguna and Yuma divisions in August and the Mohave Valley, Topock Gorge, Havasu and Parker divisions in September.

Methods

The habitat criterion developed by Smith (1974a) for clapper rails in Topock Marsh were used. These criterion allow different areas of habitat to be compared.

Habitat criterion used were:

- 1. Size of marsh area.
- 2. Water distribution in marsh.
- 3. Relative water depth, including fluctuations in water depth.
- 4. Distribution of high ground in marsh.
- 5. Composition of emergent vegetation.
- 6. Composition of high ground vegetation.

The density of emergent vegetation and the quantity of downed vegetation were not measured nor estimated.

These criterion were considered in surveying each different portion of marsh. Usually this was accomplished by boating through marsh areas, occasionally walking through the marsh to check estimations of water depth, or by climbing elevated points. Here an overview of the marsh was attained and the distribution of water and high ground, and vegetative composition could be ascertained.

Data from habitat surveys were correlated with 1973 and 1974 Yuma clapper rail population survey results and observations of rails made during this study. Areas of highest rail densities are obviously important. Areas of similar' habitat type to those maintaining high rail densities were noted. In the future these areas should be checked to see if there is clapper rail use.

Results

Imperial Valley

Smith (1974b) discusses the distribution and quality of habitat in the areas censused during 1974. Flooded fields of cattail (Typha sp.) and bulrush (Scirpus californicus) on the Wister Unit provided the best habitat, especially when fields were flooded with water less than 6 inches deep.

Two other notable concentrations of habitat exist in the Alamo River delta, just south of Red Hill Marina, and in the flooded fields of Salton Sea National Wildlife Refuge. Other areas checked contained only a limited number of scattered areas with adequate habitat.

Colorado River

Mohave Valley Division - In this division the Colorado River flows from Davis Dam to Topock through a gently sloping Mohave Valley. Most of the river banks in this division have been modified by man to control the river. The

controlled banks are generally high with little emergent vegetation. A few backwaters have been isolated along the west side. One major backwater area on the east bank, Topock Marsh, has been isolated in part but the marsh is maintained.

Seven isolated backwaters were checked along the west bank of the river, on either side of the California-Nevada border. Water inflow from the river to these backwaters has been severed and they are drying up. Emergents are absent in most backwater areas. Some habitat occurs in three small areas encompassing 10 hectares (25 acres) at approximately rivermile 435, and in part of a larger backwater at river mile 440.5. Clapper rails have not been recorded in these areas, but a closer check of these areas should be done to ascertain the northern limit of the range of the Yuma clapper rail. Most of these backwater areas are on Indian reservation land.

At present the northernmost sighting of a Yuma clapper rail made during spring surveys was at a backwater at river mile 451, just north of Needles. This is a small, privately owned, moderately open backwater, edged with emergents. It covers 16 hectares (40 acres).

Topock Marsh, part of Havasu National Wildlife Refuge, is the most significant area for clapper rails in the Mohave Valley Division. This 1,620 hectare (4,000 acre) marsh axes dominates the lower portion of this division and the habitat was analyzed by Phil Smith (1974a). Few backwaters exist now along the Colorado River parallel to and upstream from Topock Marsh which contain emergent vegetation. Channelization now limits emergent vegetation along the main river channel.

Topock Gorge Division - In the Topock Gorge Division the Colorado River winds through the steep, needle-shaped Chemehuevi Mountains. Steep banks are commonplace and many backwaters exist in mouths of small arroyos which drain into the river. Scouring and bar building have occurred at major bends in the river. Bar building is particularly noticeable on the inside exits of river bends. All river and marsh lands in this division are in Havasu National Wildlife Refuge. Water level fluctuates daily and seasonally in this division as it does in other sections of the river.

Two areas of major rail concentration exist in the Topock Gorge Division. One area is located on the Arizona side of the river, just upstream from Blankenship Bend, fromriver mile 473.3 to 474.6. This marsh has been created on the outside of a bend where the scouring of rock and subsequent bar building and growth of emergent vegetation have occurred. Thirty percent of this marsh area is open water and numerous small channels bisect the emergent vegetation dominated by cattail (Typha domingensis). of this marsh which provided habitat for the greatest number of rails were from 20 to 70 acres in size and high ground appeared as strips, isolated islands or the edge of backwaters.

The second major concentration of clapper rails has been located south from Blankenship Bend (river mile 475.1) to river mile 477.7 where the Colorado River flows into Lake Havasu. Mid-river bars of this delta support large stands of cattail and bulrush (Scirpus californicus). Many channels of open water bisect the habitat and high ground is limited to only a relatively few small islands.

Havasu Division - Lake Havasu dominates the Havasu Division. The larger portion of this lake lies in Chemehuevi Valley and the lower portion, as well as the Parker Strip below Parker Dam, is bordered by the Whipple and Buckskin Mountains and Aubrey Hills. There is no clapper rail habitat around Lake Havasu except in the Bill Williams delta. Downstream some habitat occurs in the Lake Moovalya area just upstream from Headgate Rock Dam. These are the only areas in the Havasu Division where clapper rails have been observed.

The Bill Williams Delta is the most important area for clapper rails in the division. This area is set aside as part of Havasu National Wildlife Refuge.

Lake Moovalya is on Indian reservation land and its total area is decreasing in size. Local storm runoff maintaining this marsh has decreased and available habitat has been reduced by probably 75 percent. Only 16 hectares (40 acres) of available habitat remain. Consideration should be given to maintaining the marsh habitat at Lake Moovalya. The lake not only supports clapper rails but numerous ducks and herons have been noted here.

The lower end of the delta of the Colorado River, as it flows into Lake Havasu, is another area of high wildlife value. Water birds-including grebes, cormorants, terms and egrets--were observed in numbers when habitat in this area was checked. Evidence of the nesting of western grebes (Aechmophorus occidentalis) was found, a generally uncommon occurrence at such a southerly latitude. Also this delta should become an important area to clapper rails as bars continue to be built and stands of emergent vegetation become established. Apparently this growth process is occurring at a rapid rate and rail use, probably occurring in a limited amount now should be high within three years.

Parker Division - In the Parker Division, the Colorado River flows through Parker Valley, where alternating high and low banks border the river. High banks seem to occur only on the west bank where the Riverside and Big Maria Mountains extend toward the river. Though backwaters and islands occur in numerous spots and emergent vegetation can be found on the inside bank of many river bends, there are few areas of extensive marsh.

Improved river banks occur on both sides of the river in Section I. Many channels have been modified into backwaters by the construction of jetties, and some backwaters have been isolated from the river by the bank improvement work. Backwater areas open to the river are flushed daily by the rise and fall in river level which may amount to a four foot vertical variation.

In Section I the important clapper rail habitat now exists in the backwaters behind the jetties. The water level varies but emergent vegetation grows over a long slope where a small amount of standing water remains at low water. Cattails are the exclusive, emergent vegetation.

In Section II there has been very little river bank improvement. A midriver island (at river mile 545) and a well barred and channelled area on the inside of a major bend in the river (river mile 558) are the important areas for clapper rails in this division. In both of these areas emergent vegetation grows in linear strips growing along fairly steep banks.

Palo Verde Division - Throughout the Palo Verde Division the Colorado River flows in a modified channel through the heavily agricultural Palo Verde Valley. Clapper rail counts have not been made in this division because of the general lack of habitat. There are two major island situations and four major backwaters on the California side in this division. Only the Big Hole and Goose Flats areas have any habitat which might support clapper rails. These backwater areas should be checked to substantiate this suspected void in the distribution of the Yuma clapper rail.

Cibola Division - In this division the Colorado River flows through Cibola Valley, a smaller, narrower, southern extension of the Palo Verde Valley. Oxbows in riverside flats are evidence of the river's past meandering course through this valley. The river has been channelled along its whole length through this division. The original river channel is now a secondary channel in the downstream half of the division where the man-made channel does not follow the old river course.

The two areas of major importance to clapper rails in the Cibola Division are Cibola Lake and the old river channel, just downstream from the exit of the Palo Verde Main Drain. Both of these areas are in the Cibola National Wildlife Refuge. Habitat at the exit of the Palo Verde Main Drain has been created by the silt out-flow which has formed bars in the old river channel. Apparently the water flow in the old channel is insufficient to dissipate the silt down river and stands of emergent vegetation are growing in bar areas.

Imperial Division - Section I - The Colorado River flows through a constricted area caused by the proximity of the Trigo Mountains in Arizona and the Chocolate Mountains on the California side. Moderately steep hillsides cascade to the river. Along this portion of river, lakes have been created on the inside of many major bends and at mouths of washes. Marsh lands in this division are on lands administered by the Imperial National Wildlife Refuge, Bureau of Land Management, and California Department of Parks and Recreation.

Important areas for clapper rails include Walker Lake and the river area downstream to Draper Lake, Gavilan Wash area, Taylor, Island, Clear, Ferguson and Martinez Lakes.

Imperial Division - Section II - From Martinez Lake to Imperial Dam the Colorado River is bordered by rolling hills. Three-major areas, the inside of two major bends in the river and the silt drop area (reservoir area) just upstream from Imperial Dam, comprise this area. It stretches for about 7.5 river miles and encompasses the most important rail habitat on the river. All of this stretch of river is on land administered by the Bureau of Land Management.

Important blocks of habitat in this area were over 10 hectares (25 acres) in size and contained many small channels and some areas of open water. Ample high ground with salt cedar (Tamarix gallica) and mesquite (Prosopis juliflora and P. pubescens) were found in areas of moderate clapper rail densities. Areas with highest densities contained high ground in strips

or in many isolated islands. Areas with little high ground vegetation also supported rails when carrizo cane (Phragmites communis) was present. This usually denoted extensive areas of shallow water or slightly drier substrate. However, these areas were poor habitat when carrizo cane was not well interspersed with emergents.

Laguna Division - In this small division the Colorado River begins to flow out onto the flats north and west of Yuma. The river has been greatly modified and the major portion of water remaining in the river--after the draw off of two major canals--flows through a man-made channelwest of the old channel. The old channel and other small channels below Imperial Dam are impassible for boats. The lack of water current has allowed silting and emergent vegetation to choke these channels.

Four areas in this division are important areas for clapper rails. An area along the moderately steep-sided old river channel from river mile 659.4 to 661.0 has become shallow through silting. Emergents have overgrown the area which is occasionally interspersed by small areas of open water. Two areas on the Arizona side, an overflow area for the Gila Gravity Main Canal and Mittrey Lake,-provide substantial habitat for clapper rails. These are the areas of major importance in the division.

West Pond, a small shallow water area apart from the river and lying just west of the desilting works below Imperial Dam, was surveyed for clapper rails in 1973. None were found there during the census period but seven responses were noted during the habitat evaluation survey in late August 1974 1 This area may be an important area in the migration of rails along the river. Also black rails (Laterallus jamaicensis) have been located in the extensive areas of three-square (Scirpus americanus) found in this area.

Yuma Division - In the Yuma Division the Colorado River flows through a broad flat valley interrupted near the town of Yuma by mesas bordering the river. The river is smaller because of the water drawn out at the dams upstream. Bank modifications have occurred along the first five miles downstream from Laguna Dam. But the river flows through the remainder of the division following a relatively straight path, the channel containing many islands covered with or surrounded by emergent vegetation.

No clapper rails have been found the last two years in first five miles of the division. But from river mile 669.5 to 672.3 and 673.4 to Morelos Dam (river mile 683.7) habitat exists in a continuous band down the river. In addition a section of the abandoned Alamo Canal, on the west side of the river from Pilot Knob south to the Mexico-United States border, contains habitat utilized by clapper rails.

Good habitat in this division was characterized by two factors. First, the habitat, even though found in small parcels, forms a continuum making each small area part of a much larger area and not just an isolated patch. Yet the degree of separation of habitat areas separates rail territories and reduces conflict between pairs which might occur if the same amount of habitat were contained in one block. This would increase the carrying capacity per unit area.

Second, the river was shallow in the areas of emergent vegetation. Adequate shallow water habitat appears as a large portion of the marsh habitat as

water depths were usually less than 1 foot. Even linear riverside strips of habitat were on shallow bars.

A high population of herons were observed in this division. Most abundant were green herons (Butroides virescens) with lesser number of great blue herons (Ardea herodias) small areas of three-square bulrush exist because of the large amount of shallow water area. These areas may provide good habitat for black rails.

Discussion

Habitat Requirements

Large areas of emergent vegetation displayed the greatest use by clapper rails. Frequently large areas didn't maintain the highest rail density but size was directly proportional to the frequency that the parcel of habitat would be occupied. Areas of homogeneous habitat larger than 12 hectares (30 acres) were occupied by clapper rails more than 80 percent of the time; and parcels of habitat 8 to 12 hectares (20 to 30 acres) in size were occupied more than 57 percent of the time (Table 1). In all habitat areas surveyed, 68 percent of the clapper rails located were in habitat areas greater than 8 hectares (20 acres).

Habitat areas less than 4 hectares (10 acres) were occupied less than 20 percent of the time. However, numerous small parcels of habitat, closely grouped, can provide all features found in one large area. It is more likely that a large marsh area, whether comprised of small parcels or one large parcel, will contain all habitat elements required by clapper rails.

Considering other things being equal, and the presence of basic habitat requirements of emergent vegetation and standing water, the following habitat characteristics appeared in areas of higher than average clapper rail densities:

- 1. Water flowing through many small channels, from 0.5 to 3 meters (1.5-10 feet) wide either covered by vegetation or appearing as open water.
 - or appearing as small bodies of open water, 0.02 to 0.2 hectares (0.05 to 0.5 acres) in size.
- 2. Extensive areas of water where depth was less 0.3 meters (1 foot). Little or no daily fluctuation in water level.
- 3. High ground found in strips, or less importantly as small isolated islands.
- 4. Emergent vegetation being cattail and bulrush with little or no carrizo cane. In areas of carrizo cane stem density is generally too high and there are few down stems.

Important Areas for Clapper Rails

Twenty-four areas of importance to clapper rails were noted and are identified in Appendix 5 and Figures 1 through 7. Areas were deemed important by

TABLE 1

FREQUENCY OF OCCUPATION OF DIFFERENT SIZE AREAS OF HABITAT BY CLAPPER RAILS, 1973-1974

Frequency, in Percent, of Occupation During Surveys						eys	
Size Of Area	Topock Gorge Division			Imperial Division	Laguna Division	Yuma Division	All Areas Surveyed
20+ hectares (50 + acres)	100 (6) ^{1/}	83 (6)	0 (2)	93 (14)	(0)	(0)	86 (28)
12-19.8 hectare (30-49.5 acres)		100 (2)	100 (2)	7 5 (16)	50 (4)	100(4)	80 (38)
8-11.8 hectare (20-29.5 acres)		25 (4)	100 (2)	7 1 (41)	(0)	(0)	57 (30)
4-7.8 hectares (10-19.5 acres)	(26)	3 3 (6)	17 (6)	42 (12)	O (6)	75 (4)	37 (60)
1.2-3.8 hecta (3-9.5 acres)		25 (16)	9 (54)	32 (28)	O (10)	43 (46)	20 (212)
0.2-1.0 hectare (0.5-2.5 acres)		O (4)	5 (44)	O (4)	O (12)	33 (88)	16 (204)

^{1/} Number of habitat parcels in each division.

observing the number of rails found in each area during the yearly censuses and by comparison of habitat with areas maintaining a high number of rails.

Four of the five areas of greatest importance to clapper rails are located along the Colorado River; two of these areas comprise the delta area of the Colorado River in Mexico. Over two years, these five areas have maintained 42 to 52 percent of all clapper rails located during the May censuses (Table 2). Along the Colorado River, the two areas in the United States, Topock Marsh and the area just above Imperial Dam have provided habitat for 27 to 31 percent of all clapper rails (Table 2). These figures varied from 1973 to 1974 and between figures used for total population size (Table 2).

All other areas of importance are located along the Colorado River. They extend from the Topock Gorge Division to the Yuma Division with at least one area from every intermediate division except the Palo Verde Division (Appendix 5, Figures 1 through 6). From almost 31 to 36 percent of all Yuma clapper rails were located in these other areas of importance.

Therefore, 79 to 83 percent of all Yuma clapper rails located during May censuses were found on areas herein classified as important. Of this number of clapper rails found in important areas, 22 to 32 percent of these were found on areas contained on national refuge lands, and 4 to 11 Percent on State wildlife refuges. The Bureau of Land Management has control over the area just above Imperial Dam, the single most important spot for the Yuma clapper rail, as well as other areas in Laguna and Yuma divisions. The ownership of other areas of importance to the Yuma clapper rail is divided among private, Bureau of Reclamation and Indian reservation interests. The ownership of land in the Colorado River delta in Mexico is unknown.

Please note that one area, Cibola Lake, was listed as an area of some importance to Yuma clapper rails on the basis of only one year's census results. Three other areas in the Imperial Valley, Salton Sea National Wildlife Refuge, and the deltas of the New and Alamo rivers, were censused only in 1974 and complete counts were not made. Rail densities for these three areas are unknown, but if they are similar to those areas classed as important in this report, then they too should be listed.

LITERATURE CITED

- Smith, P. M. 1974a. Yuma Clapper Rail Study, Mohave County, Arizona, 1973. Calif. Dept. of Fish and Game, Wildlife Management Branch, under Federal Aid Project W-54-R, "Special Wildlife Investigations,' Job 11-5.9. 27 pp.
- Smith, P. M. 1974b. Imperial Valley Clapper Rail Survey. Calif. Dept. of Fish and Game, Wildlife Management Branch, under Federal Aid Project W-54-R, "Special Wildlife Investigations," Job 11-5.9, 5 pp.

TABLE 2

OCCUPATION OF AREAS IMPORTANT TO YUMA CLAPPER RAILS, 1973-1974

		Per	cent of	Clapper	Rails Fo	ound in	Areas of	Impor	tance	
	utn	nost	Ma	jor	_ Impor	tant	Min	or	Tot	al
Percent of:	1973	1974	1973	1974	1973	1974	1973	1974	1973	1974
No. rails reported located	42	52	13	11	13	11	11	8	80	83
No. rails for which location data available	47	52	14	11	13	11	12	8	86	83
No. rails reported along Colo. R.	43	50	13	13	12	13	11	9	79	86
No. rails reported excluding Colo. R. delta	32	46	15	13	15	13	13	9	75	81
No. rails reported along Colo. R. excluding Colo. R. delta	32	42	15	15	15	15	13	11	75	84

APPENDICES

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APPENDIX 3

YUMA CLAPPER RAIL CENSUS RESULTS, 1973-1974

	Location	No. Clapper Rails Found			
Division		1973	1974		
Mohave Valley		104 1/	59		
	Main river channel Topock Marsh	6 98	n.c. ^{1/} 59		
Topock Gorge		46 ^{3/}	73		
	Topock Bridge-Blankenship Bend Blankenship Bend-Castle Rock Bay	23 19	62 11		
Havasu		174/	25 ^{5/}		
	Lake Havasu Bill Williams Delta Parker Dam-Headgate Rock Dam	n.c. 17 5	n.c. 25 11		
Parker		33 ^{6/}	4 7 /		
	Section I Agnes Wilson bridge-Hall Island Hall Island-Palo Verde Diversion	9 12	16 3		
	Dam	8	9		
Palo Verde		n.c.	n.c.		
Cibola		44	20		
	Horace Miller Co. Park-beg. new channel cut Old river channel to Adobe Ruin Cibola Lake	1 24 19	n.c. 20 n.c.		
Imperial		3348/	3149/		
	Adobe Ruin-Light House Rock Light House Rock-mouth Taylor Lak Mouth Taylor Lake-rivermile 649 River mile 649-Imperial Dam (incl Martinez Lake)	64	21 ¹⁰ / 13 38 241		
Laguna		88 ^{11/}	51 ^{10/}		
	Gila Gravity Main Canal overflow area Imperial Dam-Laguna Dam Mittry Lake	26 16 46	41 ¹⁰ /20		

APPENDIX 3 (CONT.)

YUMA CLAPPER RAIL CENSUS RESULTS, 1973-1974

I	ocation	No. Clapper Rails Found			
Division	River Section	1973	1974		
Lower Gila		14	18		
Yuma		57 12/	76		
	Laguna Dam-downstream end of channel End of channel-RR bridge at Yuma RR bridge at Yuma-Morelos Dam	4 26 29	0 28 48		
Limitrophe		7 13/	7		
Colorado River Delta	Marsh Area Rio Hardy	145+ ^{14/}	104+ 74 30		
Total Colorado River		889 ^{15/}	787 ^{16/}		
Imperial Valley	•	n.c.	134		
	Wister Unit-Imperial W.A. Finney-Ramer Unit-Imperial W.A. Salton Sea N.W.R. Alamo River Delta New River Delta		86 86 15+ 12+ 16+		
Total Yuma clapper rail population censused		905 ^{16/}	921 ^{17/}		

^{1/} Location Maps-show 108 dots representing 108 clapper rails. Smith (1974a) reported 115 birds located during breeding season.

^{2/} n. c. indicates no count made

Location Maps show 42 dots representing 42 clapper rails. 22

^{5/} Raw data indicate 36 clapper rails found.

^{6/} Location Maps show 29 dots representing 29 clapper rails.

^{7/} Raw data indicate 28 clapper rails found.

^{8/} Location Maps show 268 dots representing 268 clapper rails.

^{9/} Raw data indicate 313 clapper rails found.

^{10/} Only a partial count was made of this area during 1974.

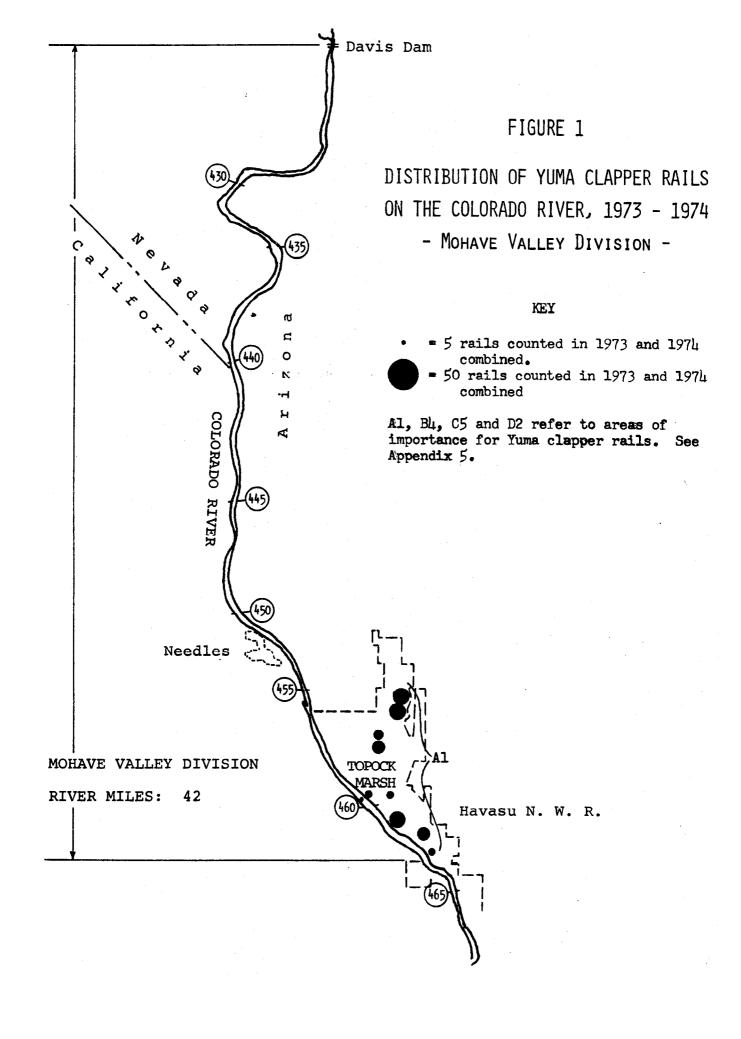
^{11/} Location Maps show 74 dots representing 74 clapper rails.

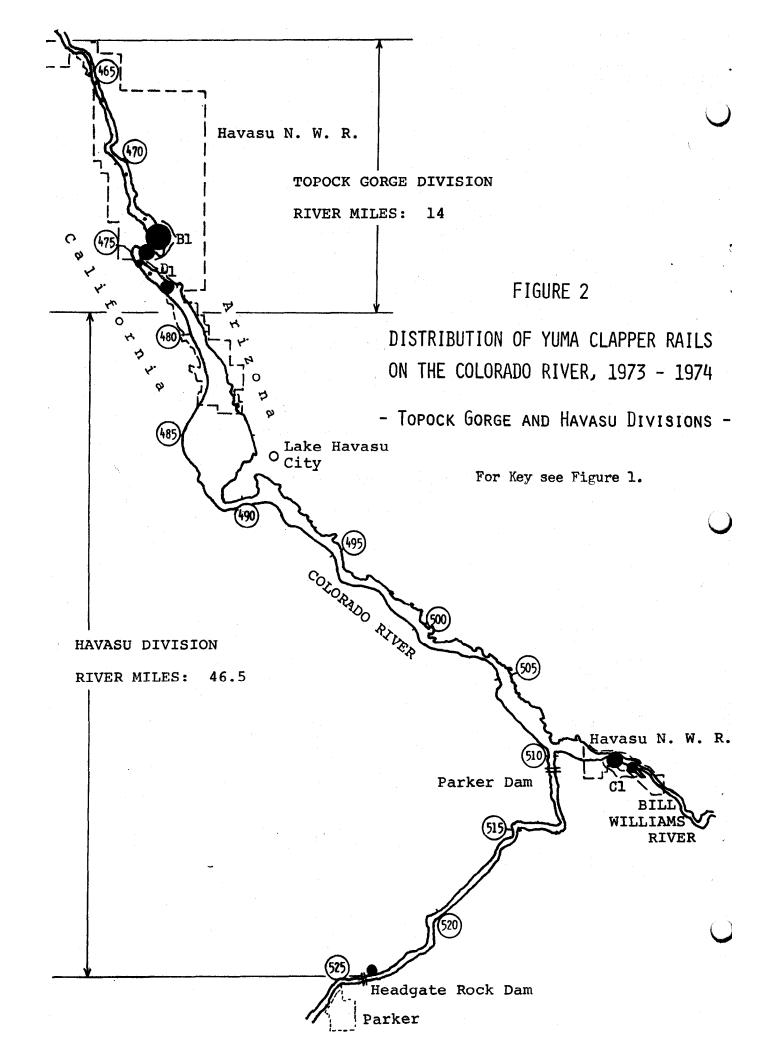
^{12/ &}quot; " 59 " " 59 13/

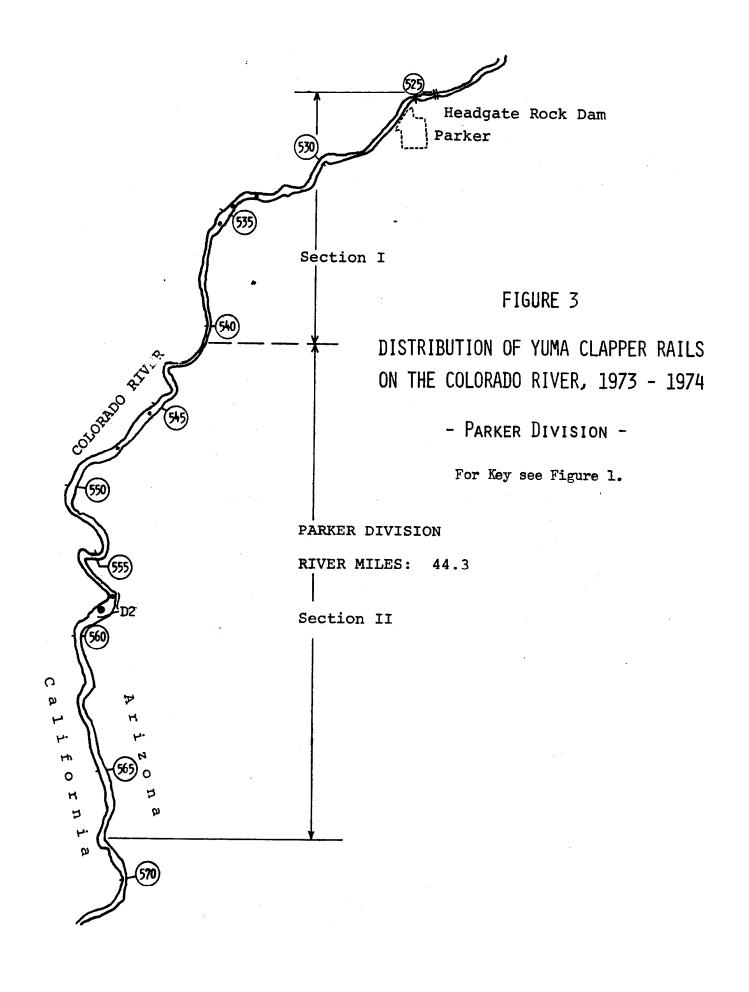
^{14/ +} indicates count only partial and not a full census of the area.

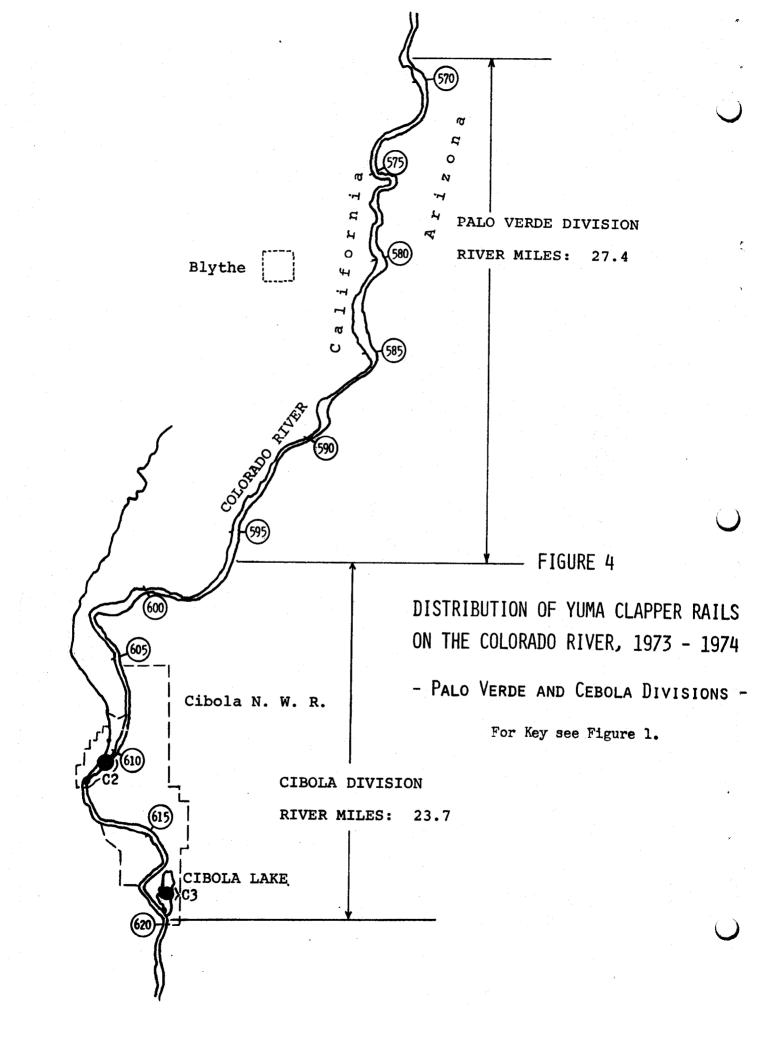
^{15/} Location Maps show 813 dots representing 813 clapper rails. 16/ Raw data indicate 785 clapper rails found.

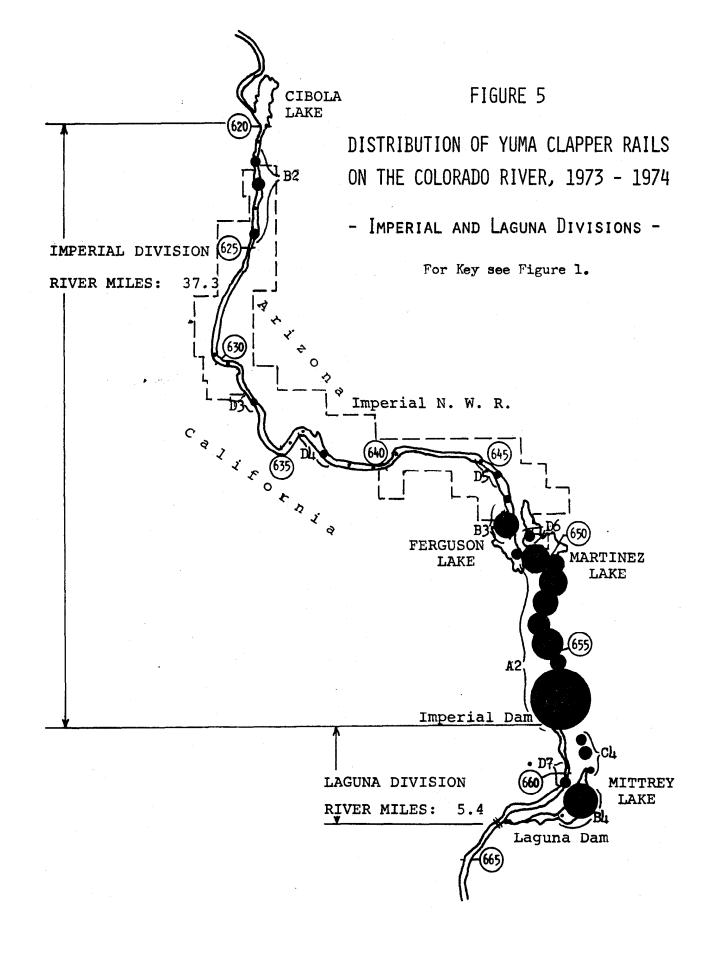
¹⁷ Raw data indicate 919 clapper rails found.











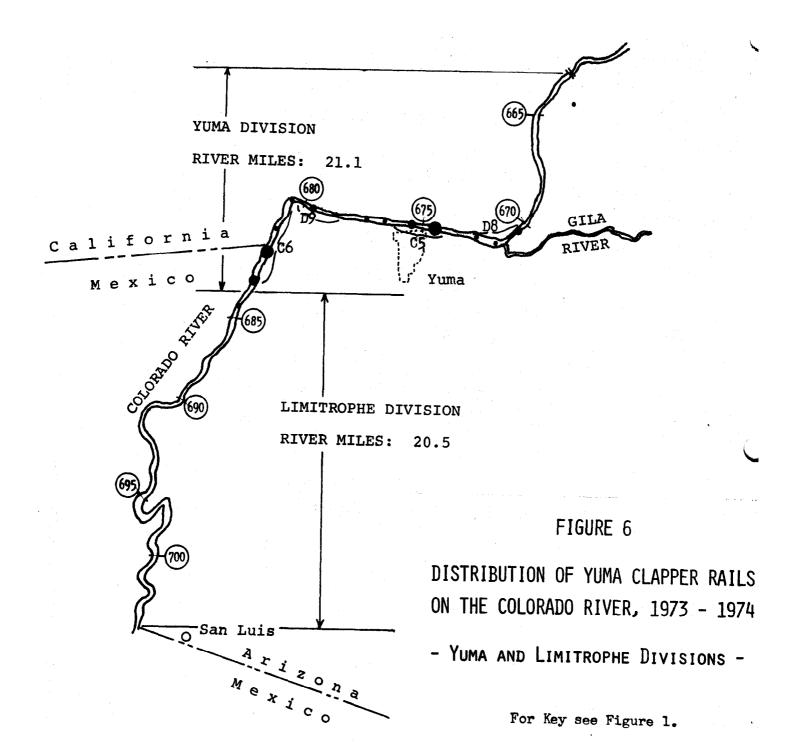


FIGURE 7

DISTRIBUTION OF YUMA CLAPPER RAILS IN THE IMPERIAL VALLEY, CALIFORNIA, 1974

For Key see Figure 1.

